

Supplementary Information

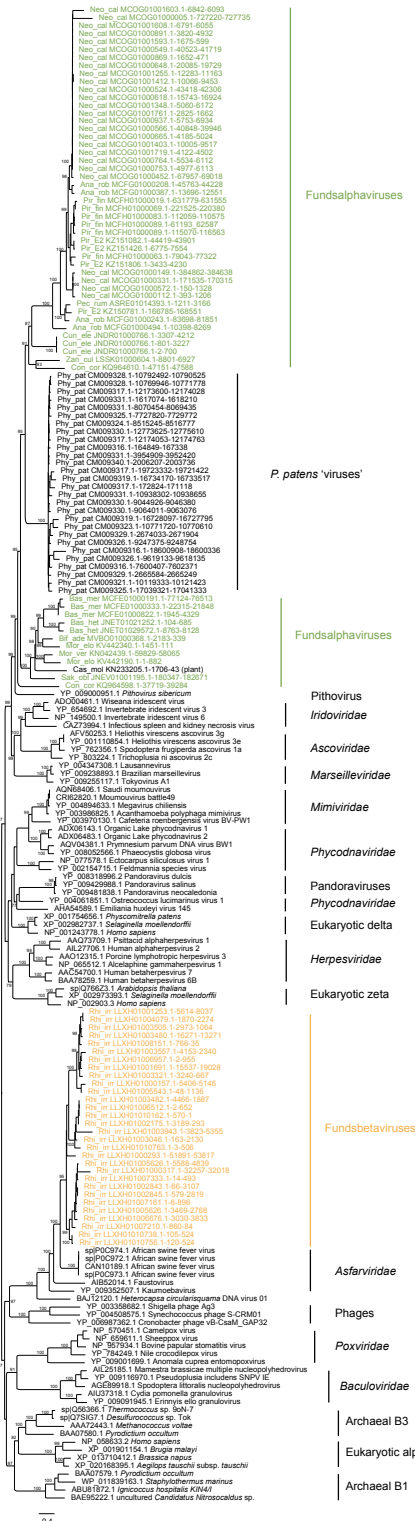
Supplementary Table 1. Information on fundsalphaviruses and fundsbetaviruses

Virus	Fungus phylum	Fungus species (abbreviation)	Accession No.	Virus copy No.	DNAP Position
Fundsalphavirus	Neocallimastigomycota	<i>Neocallimastix californiae</i> (Neo_cal)	GCA_002104975.1	1	MCOG01000005.1_727220-727735
				2	MCOG01000112.1_393-1206
				3	MCOG01000149.1_384862-384638
				4	MCOG01000331.1_171535-170315
				5	MCOG01000452.1_67957-69018
				6	MCOG01000524.1_43418-42306
				7	MCOG01000549.1_40523-41719
				8	MCOG01000566.1_40848-39946
				9	MCOG01000572.1_150-1328
				10	MCOG01000618.1_15743-16924
				11	MCOG01000648.1_20085-19729
				12	MCOG01000665.1_4185-5024
				13	MCOG01000753.1_4977-6113
				14	MCOG01000764.1_5534-6112
				15	MCOG01000869.1_1652-471
				16	MCOG01000891.1_3820-4932
				17	MCOG01000937.1_5753-6934
				18	MCOG01001255.1_12283-11163
				19	MCOG01001348.1_5060-6172
				20	MCOG01001403.1_10005-9517

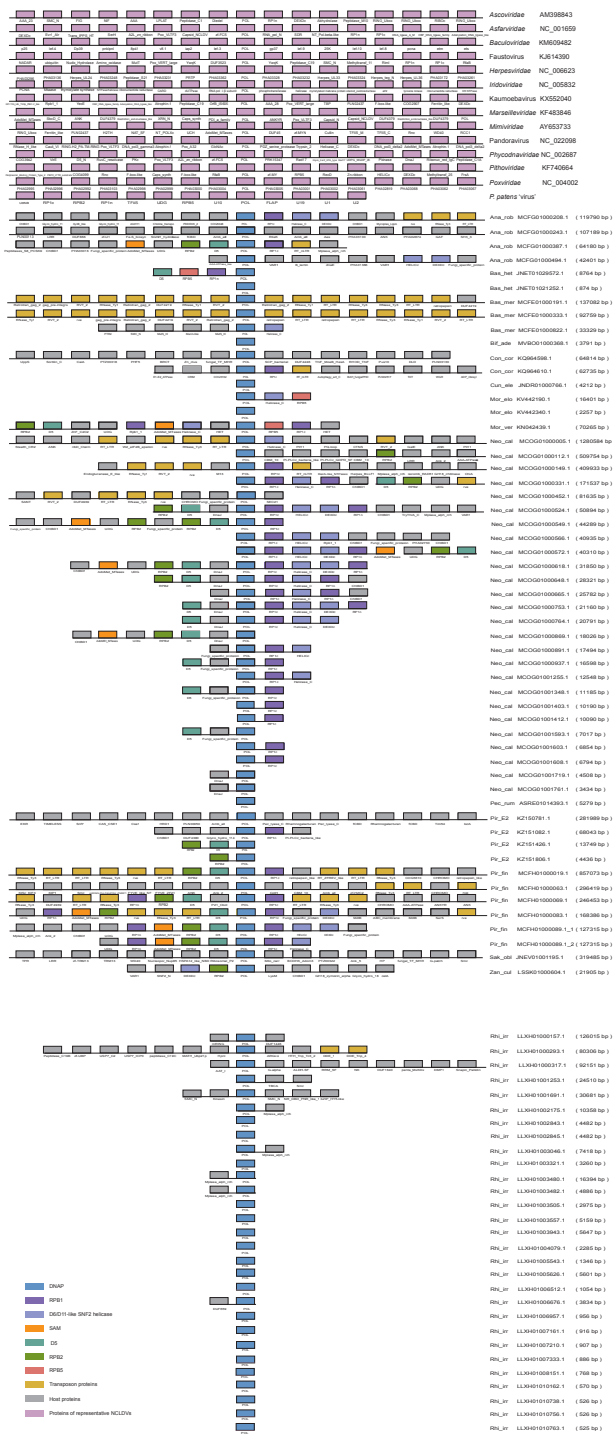
			21	MCOG01001412.1_10066-9453
			22	MCOG01001593.1_1675-599
			23	MCOG01001603.1_6842-6093
			24	MCOG01001608.1_6791-6055
			25	MCOG01001719.1_4122-4502
			26	MCOG01001761.1_2825-1662
	<i>Piromyces finnis</i>	GCA_002104945.1	1	MCFH01000019.1_631779-631555
	(Pir_fin)		2	MCFH01000063.1_79043-77322
			3	MCFH01000069.1_221525-220380
			4	MCFH01000083.1_112059-110575
			5	MCFH01000089.1_115070-116563
			6	MCFH01000089.1_61193-62587
	<i>Anaeromyces robustus</i>	GCA_002104895.1	1	MCFG01000208.1_45763-44228
	(Ana_rob)		2	MCFG01000243.1_83698-81851
			3	MCFG01000387.1_13696-12551
			4	MCFG01000494.1_10398-8269
	<i>Piromyces</i> sp. E2	(Pir_GCA_002157105.1	1	KZ150781.1_166785-168551
	E2)		2	KZ151082.1_44419-43901
			3	KZ151426.1_6775-7554
			4	KZ151806.1_3433-4230
	<i>Pecoromyces</i>	GCA_000412615.1	1	ASRE01014393.1_1211-3166
	<i>ruminatum</i> (Pec_rum)			
Basidiobolomycota	<i>Basidiobolus</i>	GCA_002104905.1	1	MCFE01000191.1_77124-76513
	<i>meristosporus</i>			
	(Bas_mer)			

			2	MCFE01000333.1_22315-21848	
			3	MCFE01000822.1_1945_4329	
		<i>Basidiobolus heterosporus</i> (Bas_het)	GCA_000697455.1	1	JNET01021252.1_685-104
			2	JNET01029572.1_8763-8128	
Mucoromycota		<i>Cunninghamella elegans</i> (Cun_ele)	GCA_000697015.1	1	JNDR01000766.1_801-3227
			2	JNDR01000766.1_3307-4212	
			3	JNDR01000766.1_2-700	
		<i>Bifiguratus adelaidae</i> (Bif_ade)	GCA_002261195.1	1	MVBO01000368.1_2183-339
		<i>Saksenaea oblongispora</i> (Sak_obl)	GCA_000697495.1	1	JNEV01001195.1_180347-182671
Entomophthoromycota		<i>Conidiobolus coronatus</i> (Con_cor)	GCA_001566745.1	1	KQ964598.1_37719-39284
			2	KQ964610.1_47151-47588	
Mortierellomycota		<i>Mortierella elongata</i> (Mor_elo)	GCA_001651415.1	1	KV442190.1_1-882
			2	KV442340.1_1451-111	
		<i>Mortierella verticillata</i> (Mor_ver)	GCA_000739165.1	1	KN042439.1_59015-58065
Kickxellomycota		<i>Zancudomyces culisetae</i> (Zan_cul)	GCA_001969505.1	1	LSSK01000604.1_8801-6927
Fundsbetavirus	Glomeromycota	<i>Rhizophagus irregularis</i> (Rhi_irr)	GCA_001593125.1	1	LLXH01000157.1_5406-5146
			2	LLXH01000293.1_51891-53817	
			3	LLXH01000317.1_32257-32018	
			4	LLXH01001253.1_5614-8037	
			5	LLXH01001691.1_15537-19028	
			6	LLXH01002175.1_3189-293	

7	LLXH01002843.1_66-3107
8	LLXH01002845.1_579-2819
9	LLXH01003046.1_163-2130
10	LLXH01003321.1_3240-667
11	LLXH01003480.1_16271-13271
12	LLXH01003482.1_4466-1887
13	LLXH01003505.1_2973-1064
14	LLXH01003557.1_4153-2340
15	LLXH01003943.1_3823-5355
16	LLXH01004079.1_1870-2274
17	LLXH01005543.1_48-1136
18	LLXH01005626.1_3469-2768
19	LLXH01005626.1_4839-5588
20	LLXH01006512.1_2-652
21	LLXH01006676.1_3030-3833
22	LLXH01006957.1_2-955
23	LLXH01007161.1_6-896
24	LLXH01007210.1_860-84
25	LLXH01007333.1_14-493
26	LLXH01008151.1_766-35
27	LLXH01010162.1_570-1
28	LLXH01010738.1_105-524
29	LLXH01010756.1_120-524
30	LLXH01010763.1_3-506



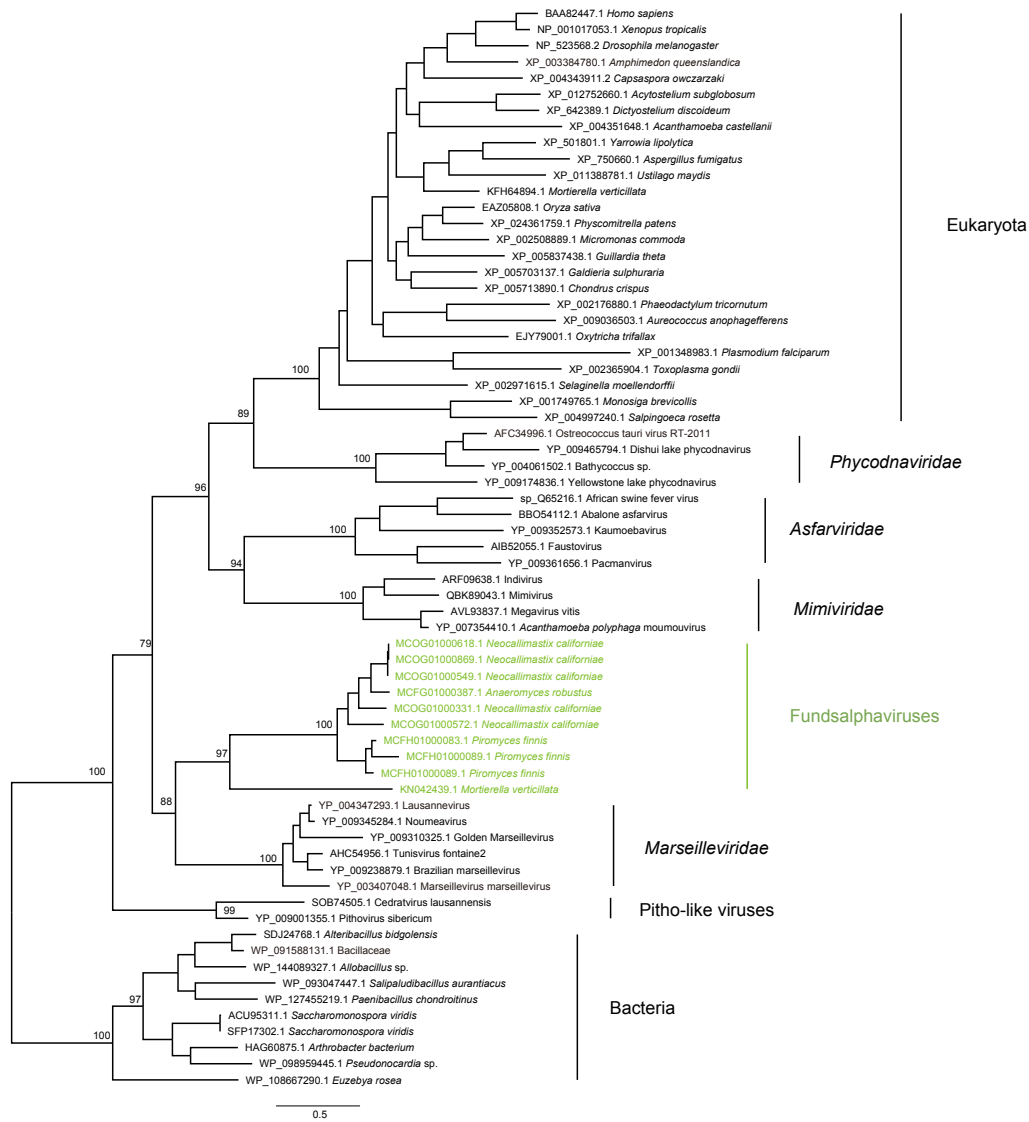
Supplementary Figure 1. ML tree for DNAP. Fundsalphaviruses and Fundsbetaviruses were labeled in green and orange, respectively.



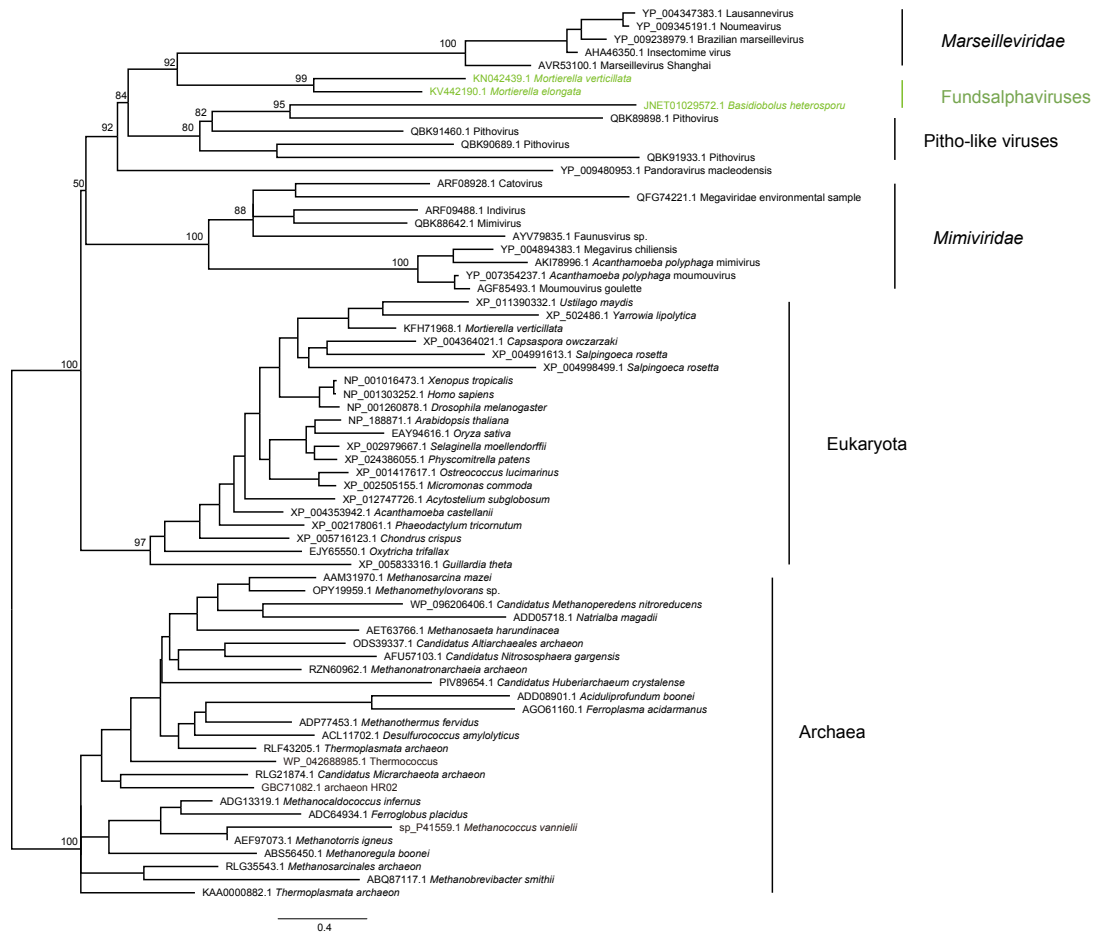
Fundsalphaviruses

Fundsbetaviruses

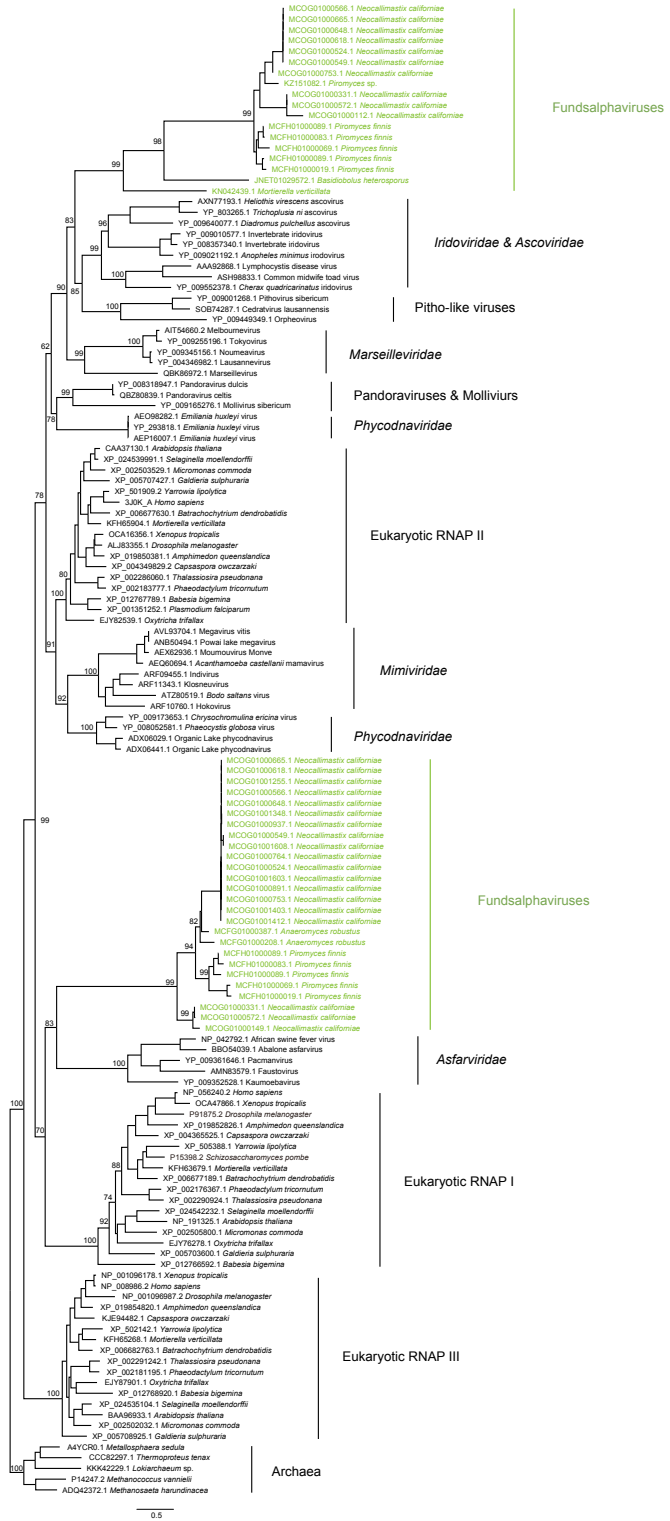
Supplementary Figure 2. Gene contents of Fundsalphaviruses, Fundsbetaviruses, other dsDNA virus families, and *P. patens* 'virus'. Different conserved proteins and proteins involved in transposition were labeled by different colors.



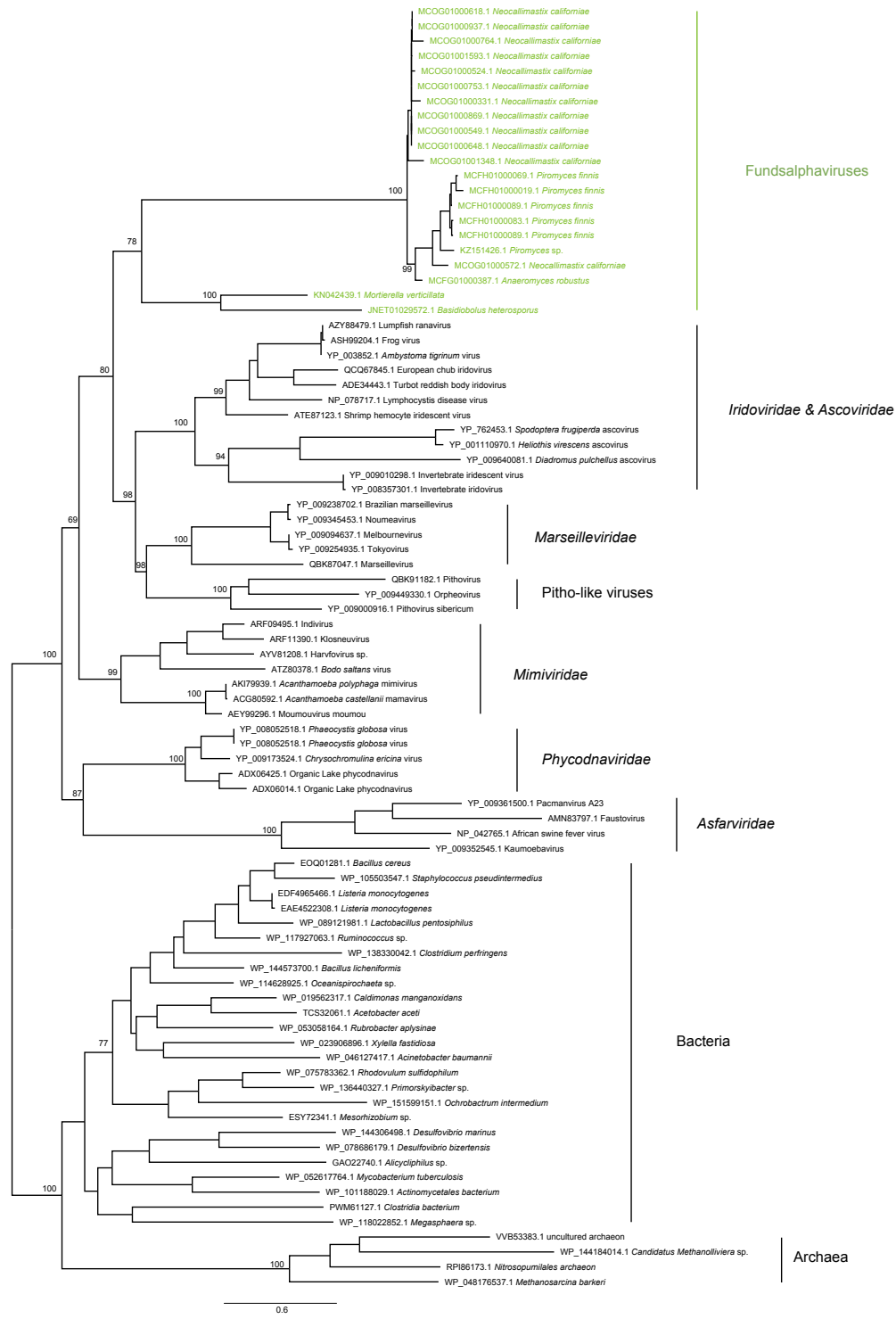
Supplementary Figure 3. ML tree for SAM. Fundsalphaviruses were labeled in green.



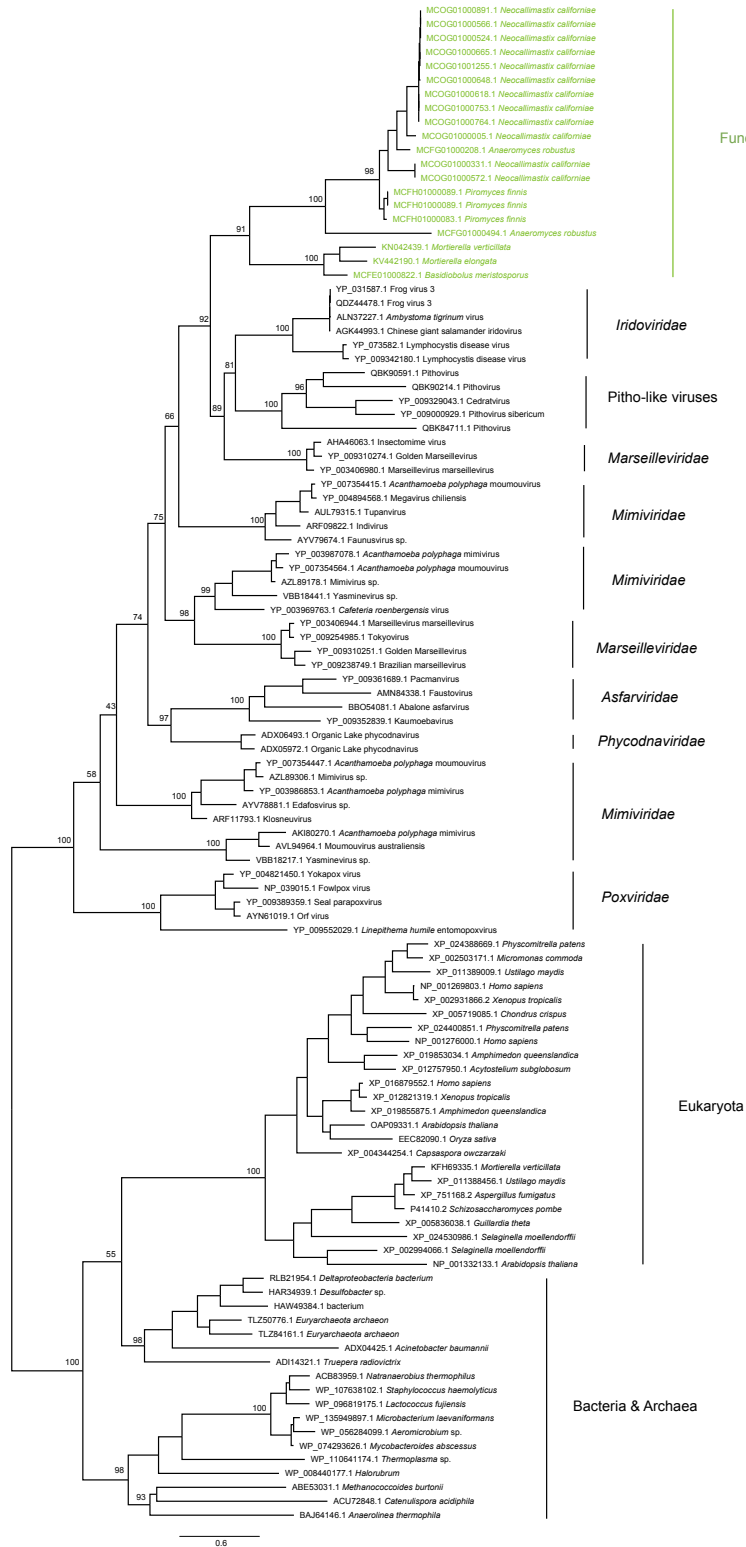
Supplementary Figure 5. ML tree for RPB5. Fundsalphaviruses were labeled in green.



Supplementary Figure 6. ML tree for RPB1. Fundsalphaviruses were labeled in green.



Supplementary Figure 7. ML tree for D5 helicase-primase. Fundsalphaviruses were labeled in green.



Supplementary Figure 8. ML tree for D6/D11-like SNF2 helicase. Fundsalphaviruses were labeled in green.



Supplementary Figure 10. ML tree for MCP. Viruses and significant hits from fungi were labeled by blue and orange, respectively.